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ABSTRACT

To determine the effects of an aquatics program on the psycho-motor functions and body image of trainable mentally handicapped children, 40 children under 16 years of age were selected, and 29 children instructed three days per week over a period of one year. Results did not support the hypothesis that subjects in instructional aquatic classes would show significant psychomotor improvement as compared to those not participating. Researchers indicated that the appropriateness of the testing tools were questionable. Responses from teachers and parents led the researchers to feel that while there were no significant gains in perceptual motor abilities, the ego involvement provided by the program appeared to result in improved personal relationships among peers, teachers, and parents. (CJ)

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A Research Effort of
The Educational and Cultural Center
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Investigations of the Effects of an Aquatics Program on the Psycho-Motor Functions of Trainable Mentally Retarded Children

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METROPOLITAN AQUATICS PROGRAM

for the

[redacted]

Room 215, Midtown Plaza
700 East Water Street
Syracuse, New York 13210

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Abstract

A. Research

The Metropolitan Aquatics Project for the Handicapped is based on the sequential aquatic techniques developed by the council for National Cooperation in Aquatics in cooperation with the American Association for Health, Physical Education and Recreation.

B. Subjects

Trainable Mentally Retarded Children. The term Trainable Mentally Retarded applies to any child whose I.Q. as measured by either the WISC or Stanford-Binet is at least 25 but no greater than 50.

1. Treatment group

a) Intact classes from the Dellslie Stows School conducted by the Board of Cooperative Educational Services of Onondaga County. (Subjects were 15 years of age or younger as of September 1, 1968).

b) N = 39. It should be noted that the potential N was somewhat larger but was reduced to 39 through attrition due to unscoreable protocols and other factors.

c) The treatment group received aquatics instruction three days per week for approximately one hour. (i.e., this group bowled as part of their regular program at Dellslie Stows School).

2. Control Group

a) Four school classes from Cedarsburg (3), Oswego (3), and West Rome (3).

b) N = 21. The potential sites were discontinued by principals unwilling to age - those 16 years of age by September 1, 1969 and unacceptable protocols, particularly from younger children.

c) The two groups from West Rome had the advantage of a comprehensive physical education program on a daily basis.

C. Question

What, if any, are the effects of an aquatics program on the psycho-motor functions of Trainable Mentally Retarded Children?

D. Design

1. Non-equivalent control group.

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2. Independent variable - Aquatics Program

3. Dependent variable - psycho-motor function.

a) Perceptual-motor as measured by the Bender-Gestalt: Keppits scoring.

b) Body image as measured by the Goodenough-Harris Draw-A-Person Test.

E. Data Collection

Pre and post testing was done by Messers. Miller and Tierney who also scored the Bender-Gestalt's. Koppits scoring. The inter-rater correlation was .89 (Pearson "r") on a random sample of 10 protocols.

The DAP was scored by Mr. William Fitzsimons, Psychologist at the Carlisle Street School.

F. Data Analysis

A "t" test for independent sample means was used. An assumption was that since Trainable Mentally Retarded children make up a legally defined group, the group variance for intact groups would not be significant. This assumption was tested against the H_o: "There is no pre-treatment difference between treatment and control groups as measured by the Bender-Gestalt."

The "t" test was applied to the post test results from the B-G and DAP and it indicated that there was no difference in the groups.

G. Conclusions

We have recognized from the outset that we were dealing with "dirty" research. We realized that we were going to generate more questions than we could investigate. Below are some of the questions we either left un-resolved or generated.

1. Since many of the unscoreable protocols come from young subjects (seven years of age or younger), is there a negative

interaction between young Trainable Mentally Retarded male-people and unconstructive workers?

5. What effect, if any, does sex have on this type of study?

5. Is the rate of psycho-motor development in Trainable Mentally Retardeds so slow that a study spanning only one program a year is insufficient?

6. Would institutionalized Trainable Mentally Retardeds be a more appropriate population for study and do they differ from the non-institutionalized Trainable Mentally Retardeds?

8. Are the S-Q and CMF appropriate for, or sensitive enough for this purpose?

8. Is there a difference between Mongoloid and non-Mongoloid retardates?

9. Is testing time (elapsed time) a critical variable?

10. Are any pencil and paper tests appropriate for use with Trainable Mentally Retarded subjects?

11. Are extraneous stimuli in the testing environment an important factor with Trainable Mentally Retarded subjects?

I. Statement of Problem

There has been increasing interest in exploring the role of perceptual-motor activities within the total educational program. Although several viewpoints regarding the relationships of physical activities in promoting perceptual-motor skills have emerged, there is a strong conviction, that through the use of sequential locomotor activities, the central nervous system functioning of atypical youngsters may be enhanced.

Most special classes have been designed to develop the child's social competence, personal adequacy, and occupational skills rather than to provide training in generalized sensory and perceptual-motor skills.

Educators need to know about children's perceptual-motor growth if they are to appropriately plan class activities. If sensory and perceptual-motor skills can be cultivated through instructional programs then perhaps the misapplication of present techniques can be avoided. Any knowledge of a child, whether it be of his perceptual-motor development or emotional-social behavior, will lead to greater responsibility in the instructional process. If it can be shown that a systematically applied aquatics program will result in increased perceptual-motor abilities, the permanent implementation of similar programs becomes justifiable.

II. Review of the Literature

It is not within the scope of this study to review exhaustively the literature; however, it is generally accepted among many authors that such behaviors as seeing, hearing, and intellectual functioning will improve if certain simple motor tasks are practiced. Piaget, Gagliard and others have attested to the importance of early motor learnings in the development of the intellect basing their findings on observations that the first kind of behavior that children evidence is motoric. (Kephart, 1967).

Other studies provide further evidence that there is a relationship between motor achievement in the mentally retarded, visual-motor coordination, and perception as measured by the Bender-Gestalt Test. Although B-G performance is expected to improve with age, several studies have shown that B-G performance in the mentally retarded remains stable over a period of time. (Riggins, 1968; Silverstein and Shotwell, 1963).

Webb (1968) has shown that profoundly retarded individuals possess gross underdevelopment in four areas of behavior: exploratory, movement, manipulation of the environment and posture and locomotion. The inability to profit from these experiences often leads to distorted self-concept and body image development. If body image and self-concept are to develop in the trainable retarded, they must be encouraged through externally imposed stimulation.

Frostig (1967) justifies perceptual-motor training on that it helps

in the development of some very basic attitudes which underlie all or most behavior, and that these attitudes may be transferred to the acquisition of other skills and behavior. Frostig further states that better movement skills tend to make the child more acceptable to his peers, his family, his teachers, and other adults. Better movement skills, especially manipulatory skills, also tend to make the child more independent of adult help, and therefore more self-reliant and often less anxious.

Better sensory-motor skills tend to result in improved perceptual skill, including perception of direction, distance spatial relationships, time intervals, and so on. Such training can also foster improvement in sequential processes and memory skills, and in learning and remembering sequences.

Some educators such as Barsch (1961) and Kephart (1960) feel that perceptual-motor training must occupy a central role in remedial programs for the educationally handicapped child. It is interesting to note that authors such as Frostig (1967), Barsch (1961) and Kephart (1960) have not intensively directed their research to teachable children. They often direct their energy to those children of normal or potentially normal intelligence, without severe sensory or extreme motor handicaps.

The relationship of physical activities to promoting body image development is also discussed in the literature, although its measurement is felt to be without experimental validation. Levy (1958) feels that one cannot obtain valid qualitative data from drawings. However,

despite the controversy over the validation of analyzing body image or any of the many other variables through human figure drawings, they still remain important clinically.

There seems to be little question as to the acceptance of the concept that until a child understands his body in terms of separate and total functions, learning in socially acceptable ways cannot take place. How the individual develops an "image" of his body remains controversial and how the writers develop methodologies for measuring it are still questionable; however, its existence in the child's total organization is not doubted.

The great bulk of research on drawings appears to be descriptive, and very few writers have an acknowledged, systematic theory.

> ....Depending on one's theoretical and practical position and the details of drawing behavior to which he attends, he may find evidence for any position. If he is an academic or developmental psychologist, he is likely to view drawing as signifying cognitive content. If he is interested in personality development and deviations, is a clinician and therapist, or is an art educator, he is likely to favor the emotional expression hypothesis. (Harris, 1963, p. 227).

In general, the literature appears to support the concept that perceptual-motor training helps to develop experiences important in the development of higher skills and behavior. Little research has been accomplished concerning the acquisition of these skills for trainable retarded children. A print-out of references and abstracts for this study by the National Institute of Mental Health on the subject, "Fitness and Physical Education for Handicapped," revealed that out of 150 articles

reviewed, some were related to aquatic programs.

III. Hypothesis

This investigation concerns itself with two areas: Perceptual-motor function and body image.

H 1.1 The treatment group will show a greater improvement in perceptual-motor function than the control groups.

H 1.2 The treatment group will show a greater improvement in body image than the control group.

IV. Design

A non-equivalent control group design was used. Intact groups of trainable mentally retarded students less than 16 years of age were used.* The experimental group was from the DeVille Sloan BOCES School in Syracuse. The control group was made up by combining four Trainable Mentally Retarded groups from Rome (2), Oswego (1), and Ogdensburg (1), New York.

It was the feeling of the investigators that since trainable mentally retarded children comprised a narrowly defined population, intact non-institutionalized groups within the population would not differ sig-

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*In New York State, a Trainable Mentally Retarded person is defined as a person whose I.Q. is between 25 and 50 as measured by the WISC or Stanford-Binet.

sufficiently from each other. This assumption was tested by analyzing the pre-test Bender-Gestalt by the "t" test for independent sample means. The results will be discussed in the data analysis.

The independent variable was a modified aquatics instructional program developed by the Council for National Cooperation in Aquatics and the American Association for Health, Physical Education and Recreation. The subjects participated three times a week for about one hour each time.

The dependent variables were perceptual-motor function and body image.

V. Instrumentation

The Bender-Visual Motor Gestalt Test was selected as the instrument to measure pre and post perceptual-motor skills. The Developmental Scoring System as outlined in Koppitz (1968), was used and reveals considerable qualitative data. The test is considered to measure a "Gestalt function" in which the reproduction of model figures by the testee reflects his maturational status through perceptual processes. Scoring is also used to gather information such as emotional and social growth (Bender, 1962). The quantitative scoring on the B-G is most predictive when used with a normative population between the ages of five and ten and one-half. Although the ceiling is at 10 and 1/2 for normal children, it can be applicable to those with higher and lower chronological ages who have mental abilities falling within this range.

The Goodenough-Harris Draw-A-Person Test, along with the B-G, reveals a variety of clinically useful signs, especially as the child experiences his own body image perceived through many sense modalities. This test reveals the child's perception of himself and permits an estimate of his developmental level (Harris, 1963). Essentially, it reveals the child's self-perception: a reflection of such personal attributes as preoccupation, anxiety, body image and self-concept.

Distortions in drawings have both literal and symbolic representations of the individual's self-image. Such is the theory of Machover (1949), Buck (1948) and others. As Machover states:

> The body, or the self, is the most intimate point of reference in any activity. We have, in the course of growth, come to associate various sensations, perceptions, and emotions with certain body organs. This investment in body organs, or the perception of the body image as it has developed out of personal experience, must somehow guide the individual who is drawing in the specific structure and content which constitutes his offering of a "person."

VI. Data Collection

The data was collected by the investigators. In all but a limited number of pre-test observations, the Bender-Gestalt and DAP were both administered to a subject by the same investigator. No attempt was made to randomize the test administration, as administrator contamination is not a serious problem with the B-G and DAP. Inter-rater reliability was a concern. Five subjects were chosen at random from each rater's population, giving a total of ten for comparison. The raters then rescored

each others' protocols and a Pearson product moment "r" was run yielding a correlation of .89 on a sample of 10.

VII. Data Analysis

The "t" Test for independent samples means was chosen to analyze the data. The fact that the groups were intact, rather than randomly selected and assigned technically violates an assumption of the "t". However, Kerlinger indicates that unless one has reason to suspect a grossly non-normal sample, the "t" Test will give results we can accept with a high degree of confidence. In addition, as previously stated, the investigators felt that since Trainable Mentally Retarded is narrowly defined in New York State, that the population would possess a high degree of homogeneity.

The data was tabled (attached) with EM = 39 and CM = 21.

Demographic Information

Experimental	Control
N = 39	N = 21
Mean Age = 11.4	Mean Age = 11.5
Percentage Male = 74.35%	Percentage Male = 52.38%
Percentage Female = 25.65%	Percentage Female = 47.62%
Pre DAP Mean = 57.44	Pre DAP Mean = 57.42
Pre DAP S.D. = 4.86	Pre DAP S.D. = 4.53
Post DAP Mean = 56.18	Post DAP Mean = 57.42
Post DAP S.D. = 3.90	Post DAP S.D. = 4.53
Pre B-G Mean = 12.76	Pre B-G Mean = 13.14
Pre B-G S.D. = 3.06	Pre B-G S.D. = 2.83
Post B-G Mean = 12.46	Post B-G Mean = 12.19
Post B-G S.D. = 2.76	Post B-G S.D. = 2.71

Experimental							Control						
Subject	** A	S	D&P* Pre	D&P* Post	I-C Pre	I-C Post	Subject	** A	S	D&P* Pre	D&P* Post	I-C Pre	I-C Post
1. W.W.	13	M	66	56	13	16	1. T.C.	13	M	58	58	12	16
2. G.Mc.	13	F	69	69	10	7	2. R.L.	15	F	66	66	12	12
3. W.W.	10	M	51	51	16	16	3. M.Mc.	11	F	53	53	16	16
4. R.E.	14	M	61	53	16	16	4. C.R.	9	F	56	56	16	16
5. J.D.	14	M	53	53	12	12	5. R.C.	12	M	61	61	12	12
6. D.Mo.	14	F	69	69	7	10	6. R.C.	13	F	64	64	16	16
7. L.P.	14	F	69	69	13	11	7. R.L.	9	M	53	53	16	16
8. R.R.	15	M	51	51	16	16	8. R.D.	8	F	53	53	16	16
9. R.W.	14	M	70	61	11	11	9. W.F.	8	M	61	61	16	16
10. M.R.	15	M	51	51	13	16	10. D.Mc.	11	F	53	53	16	16
11. P.M.	13	M	56	56	16	13	11. G.R.	9	M	59	59	13	11
12. J.M.	13	M	56	56	7	10	12. J.M.	14	M	61	61	9	5
13. C.M.	13	M	64	56	11	16	13. A.L.	14	F	69	69	13	12
14. D.Mo.	9	M	59	59	13	16	14. M.G.	15	M	69	69	8	13
15. J.R.	8	M	61	61	16	16	15. P.F.	14	M	53	53	11	16
16. M.P.	13	M	56	56	16	16	16. C.R.	15	M	51	51	11	16
17. M.S.	8	F	59	59	16	16	17. L.R.	14	F	69	69	16	16
18. M.Mc.	8	M	61	61	16	16	18. D.T.	14	F	58	58	12	7
19. R.M.	7	M	64	64	16	16	19. D.M.	8	M	61	61	2	7
20. R.J.	8	F	59	59	16	16	20. M.L.	13	F	56	56	16	16
21. T.C.	7	M	56	56	16	16	21. D.L.	9	M	53	53	16	16

*Standard Score Equivalents

**Age as of September 1, 1969

Experimental

Subject	Age**	Sex	Gain*		I.Q.	
			Pre.	Post	Pre.	Post
32. L.W.	12	M	54	56	8	5
33. W.S.	13	M	51	51	16	16
34. D.E.	11	M	65	57	9	3
35. M.C.	12	F	52	52	16	16
36. L.R.	13	F	60	60	16	8
37. E.F.	12	M	56	56	16	16
38. J.C.	11	M	57	57	16	16
39. J.R.	12	M	56	56	16	16
40. D.M.	12	M	56	56	16	16
41. C.A.	11	F	61	53	10	8
42. R.M.	9	M	59	59	16	16
43. D.D.	11	M	57	57	11	11
44. R.W.	10	M	58	58	16	16
45. R.G.	10	M	58	58	16	16
46. J.F.	10	M	58	58	16	16
47. S.V.	8	F	56	56	16	16
48. M.R.	8	F	59	59	16	16
49. K.T.	9	M	59	59	16	16

*Standard Score Equivalent

**Age as of September 1, 1969

A "t" was calculated on the Bender-Gestalt pre test results to test the assumption that Trainable Mentally Retarded groups would not differ even though they were not selected at random from the population of Trainable Mentally Retarded. The "t" = 0.91241 w/df = 58. The .01 level for df = 60 is 2.66. We therefore could not reject the H_0 and felt that our assumption of homogeneity was justified.

As can be seen by the demographic information, the groups both pre and post exhibited a high degree of similarity. The results of the study have caused us to reject H 1.1 and H 1.2. The post test "t's" were respectively 0.225 for the Bender-Gestalt and 0.968 for the DAP. As stated before with df = 60 .01 = 2.66.

Discussion

The investigators now and all the way through the study viewed it as "dirty" research. The most important result of this study was to suggest new areas for investigation.

One problem that arose almost at once was subject attrition. The final total was 39 treatment group and 21 control group subjects. Because the upper age limit in the treatment group was 15 years of age or younger as of September 1, 1969, eight of the control group subjects were eliminated since they were 16 years of age or older.

Another source of subject attrition in both the treatment and control groups was the incident of unaccessible protocols. This was particularly true with the younger children. A question relevant to this phenomenon

to subject-investigator interaction. In brief, the lack of response, or bizarre patterns of responses from the younger (usually seven years or younger) subjects did not square with their teachers' perception of their capabilities. We did not have time to follow up this new aspect.

The investigators also questioned the appropriateness of the Bender-Gestalt and DAP for use with the Strauss Mentally Retarded. The Purdue Visual Survey might discriminate better.

Below is an excerpt from the first document produced by Mr. William Fillerbrown describing his observations and concerns about the project:

Results

Bender-Gestalt:

The findings did not support hypothesis one, that subjects participating in instructional aquatic classes would show significant improvement in B-G performance as compared to subjects who did not participate in such classes. The observed value of "t" was less than the 0.01 level of probability, therefore, showing no difference between the treatment and control groups.

None of the subject's scores fell in the normal range for their age groups. All scores were well below the mean for their age level. In fact, subject's scores on maturation level in visual-motor perception were generally below the mean score found in beginning first-grade students.

As suspected, the time requirements to complete all nine Bender figures was low. There appeared to be little difference between the average time required to complete the test at different age levels but lack of concentration of younger students decreased their time limits somewhat. Frequently the subjects were impulsive and perseverating so that it was difficult to carry out all the required drawings without becoming fatigued.

Qualitatively the Bender figures provided a variety of information. Some features are worthy of discussion. Using classifications according to Koppitz scoring (Koppitz, 1963), it was difficult to differentiate between the primary syndrome of either brain damage or emotional disturb-

score. That is, specific distortions and deviations on the D-G did not seem to differentiate between brain injured (primary diagnosis) and mental retarded (secondary diagnosis) subjects. The Bender, in both instances, appeared to reveal essentially the same manifestations of immaturity or poor visual-motor perception. There were a high number of distortions, rotations, and substitutions.

It is highly suspect that D-G scores are closely related to the mental age of the subjects and scores on achievement tests. Although it was not possible to test this hypothesis, a cursory examination of protocols would tend to support a high relationship.

Indicators of visual-motor perceptual problems were revealed in rotation of figures and notes by the examiners that cards were rotated. This was also noted in movements of impulsiveness, tearing of designs, and poor executions.

Draw-A-Person

The findings also failed to support hypothesis two, that subjects participating in instructional aquatic classes would show significant improvement in Draw-A-Person scores as compared to subjects who did not participate in such classes. Pre and post scores (quality scale scores) were converted to standard score equivalents. A 't' test to determine the difference level in means revealed no difference between the groups.

The drawings of human figures showed distortions of detail, omission of parts, variations in size and differences in emphasis. The disproportionately large head appeared to drawn most frequently, an indication of primitiveness revealed through retardation and, according to one author, organic brain disease (Bleichmar, 1968).

Developmentally, the head is often the first part of a human to be drawn by any child; it is the head of the adult that smiles, approves, frowns, scolds, and provides emotional security.

In general, the figures were large, empty, poorly proportioned, and weakly synthesized figures which reflect mental deficiency and shallow emotionality. The enclosed long and perseveration was typical. Some figures were simply uniformed scribblings and could not be analyzed further than to say that there was no evidence of development above the fourth-grade level.

Often the vertical dimension dominated the drawings, and indicated by either a line or (more commonly) by an undifferentiated, elongated form. The older subjects tended to depict more features in

their drawings than younger subjects and relatives to normals most drew simplified representations. A few relatively high scores caused the examiner to evaluate the child's etiology via his folder. In all instances, they were children of high trainable intelligence with an undifferentiated diagnosis, including such factors as emotional disturbance as a secondary condition to retardation.

Few of the subjects made attempts to portray the various body parts in two dimensions, as in the case of the arms, legs, and feet. Length of the fingers was not distinctively greater than hand width with no clear differentiation of the thumb from the fingers. In the case of full-length figures there was often no demarcation between the head and the trunk, feet and the legs.

Motor coordination lines (such as the long lines in arms, legs, and trunk) were not free from accidental wavering. Often the lines were "colored in" with pencil. Juncture points of lines often had a tendency to cross or overlap, or leave gaps between the ends.

The manipulations noted indicate that the trainable child has difficulty internalizing his perceptions concerning what is often referred to as body image. A number of subjects, though quite competent verbally, would not be able to identify the body parts on command; others would not be able to make spatial judgments.

In summarizing, a qualitative analysis of body image and visual-motor function in drawings show a simplification in the maturation process but with wide differences in types of drawings. In a majority of the drawings, the primitive loop is used freely. The patterns were rigid, revealing overlapping signs of organicity and emotional trauma. Such analysis supports the findings that there are multiple causes of mental retardation and no typical pattern revealed in drawings.

Limitations of Study

It should be noted that even in the event of improved performance, one may not attribute score increases to equation per se. Increases in performance may be contributed to the effects of feeling important (Oliver, 1958); motivation that results from social interaction between the testers and subjects (Reichenberg, 1953) and relationship to their teachers (Patterson, 1957).

Therefore, test scores will always vary with the motivational state of the subjects and other change-producing events that occur in addition to the dependent variables of the study. Maturation also systematically varies with time and "instrument decay" (the practice effect) may produce higher scores on those children repeatedly examined

by school psychologists, counselors, and teachers.

The attrition rate of subjects included in the original sample for testing was evident, namely because some protocols were unscorable. It would seem appropriate to use the Kuppitz (Stanberg-Sender Scoring system) if the B-G is to be used again.

Another limitation of the study lies with the lack of randomly selected subjects placed into experimental and control groups. As the literature indicates,

> It is not so much that non-random samples may not be representative; in many cases they may be representative. It is that we cannot say or assume they are representative, whereas with random samples we can say or assume they are representative (Kerlinger, 1967).

Thus, when working with samples that have not been selected at random, generalization to the characteristics or relations between characteristics in the population is, strictly speaking, not possible.

Since the experimental and control groups were not drawn at random, one cannot determine if the differences between the two groups were real or due to chance. It is undoubtedly true; however, that even if sampling procedures had been random, results would not have been significantly different, mainly because of the length of the study and slow developmental growth of the population. A longitudinal study (perhaps three years) would probably allow stronger assertion concerning the use of sequential perceptual-motor activities for investigating the efficacy of an aquatics program.

The instruments used for purposes of this study are not skewed in terms of their qualitative value. Few projective tests are. Thus, one is led to conclude that instruments to evaluate changes in perceptual-motor behavior are not yet well enough refined on trainable children to yield significant results.

Several questions have yet to be resolved. We do not yet know the training period needed to effect behavior changes in trainable subjects, the optimum age at which training should be initiated and what types of trainable retarded children can best benefit from aquatic training. It seems apparent that younger children are more conductive to the development of new perceptual-motor responses.

Conclusions

A questionnaire sent to parents with children in the aquatics program appears to confirm the suspicion that, "nothing succeeds like success." Experimental evidence confirms this (Postman and Brown, 1952; Oliver, 1958).

The questionnaire was open-ended, aimed at obtaining parent opinions concerning their child's progress and attitude toward the program. Ninety-nine percent of the responses were favorable. Statements included the following:

> This has been a tremendous accomplishment for my son, as he would have no other place to learn.
>
> My child is more relaxed and less afraid and has more confidence in himself in the water.
>
> The instructors seemed very understanding. We didn't think our son could learn to swim when this program started. Due to the good teachers, I'm happy to say we were wrong.
>
> We feel that this opportunity had extraordinary value for our child. She seemed to develop more self-confidence.
>
> It is deeply gratifying to see and hear a child when he returns home and talks about your people and the fun he had.

Most parents felt the swim program should be continued next year; however, a few felt that there was perhaps too much emphasis on swimming and not enough on academics.

Teacher comments were also favorable, but with the following recommendations for change: have more instructors in the water with the group, increase efficiency of bus schedule, perhaps extend the swim periods. Some teachers felt that their children developed more confidence, gained social skills, developed motorically, and provided a realistic situation for interpersonal experience.

Perhaps these findings are more significant than the attempts to provide quantitative data for the study. While there were no significant gains in perceptual-motor tests, the ego-involvement provided by the program appeared to result in improved personal relationships among peers, teachers, and parents. Thus interesting as the statistical findings are in terms of attempts at objectivity, they are no more valuable than the observed effects of the program on the subject's behavior - effects which are difficult to measure objectively.

The interest and involvement of students is likely to be a combination of:

1. The effect of achievement and success and improved confidence that is associated with these feelings.
2. Improved adjustment and the happier atmosphere that arises from it.
3. Improved general fitness and the feeling of well-being that goes with it.
4. The effect of feeling important due to personal involvement.

Most disappointment associated with having a handicapped child is often deep and long lasting. It can adversely influence the parents' relationships with the handicapped child by creating psychological barriers between them. The aquatics program points out what trainable children can do. It has led many parents to recognize their child's capabilities and limitations.

When parents become involved in projects organized around the interests of their children, they develop increased understanding of their problems. Lack of parental involvement may lead to complacency if they feel no additional responsibility than allowing their child to attend the program. It can be compared to citizens who contribute to a fund drive, and then feel no additional responsibility to the cause for which the money was raised.

Recreation is now recognized and accepted as an essential part of normal living. Whenever possible, the handicapped should be included in the normal recreational activities of families. The aquatics program represents a positive step in this direction.

Summary

The purpose of this project was to evaluate the perceptual-motor growth of trainable mentally retarded youngsters in an aquatics program. Its rationale was based on past research attesting to the importance of perceptual-motor learning to the development of intellect, self-concept, body image, and skills underlying all or most behavior. Results did not support the hypothesis that subjects in instructional aquatic classes would show significant improvement in B-G and DAP performance as compared to those not participating. However, observed performance of students, teacher remarks, and feedback from parents revealed there was a positive acquisition of skills and behavior as a result of the program.

The aquatics program was based on the conviction that the needs of the retarded should include an educational program that embraces an inclusive array of services, some highly specialized and some generic. Perceptual-motor training is an important aspect of this programming.

The evidence seems to indicate that motor and perceptual abilities in retarded children are organized in much the same way as in normal children and that the development of these abilities follows similar developmental curves, although at lower levels than for normal children. This suggests that trainables can profit by many of the same kind of motor experiences as normal children, although much more patience is required in setting the stage for learning.

Well organized learning experiences can result in an improvement of gross motor abilities, thus providing the foundation for many healthful and meaningful experiences between parent and child. The need for including physical activity thus appears justified.

Future research needs to:

1. Determine the effects of motivation upon perceptual-motor functioning of the severely retarded.
2. Ascertain the optimum amount of physical activity necessary for retardates and at various times in their lives.
3. Determine the effects of participation of the severely retarded in a variety of psycho-motor activities and study their effect upon such factors as self-concept, body image, confidence, desire, level of aspiration, and competitive spirit.

The skills required for some measure of success in a retarded child's life are so important that a well-organized program of physical education (including aquatics) appears justified.

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